Quality Assurance SWEN90016-S1-L2

Week 11 - Rachelle Bosua

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Outline

- Last week recap
- This week:
  - What is Quality software/software quality?
  - Quality models
  - Product versus Process
  - Tools and Techniques
  - Improvement

Lecture 2 - Week 11
QUALITY ASSURANCE

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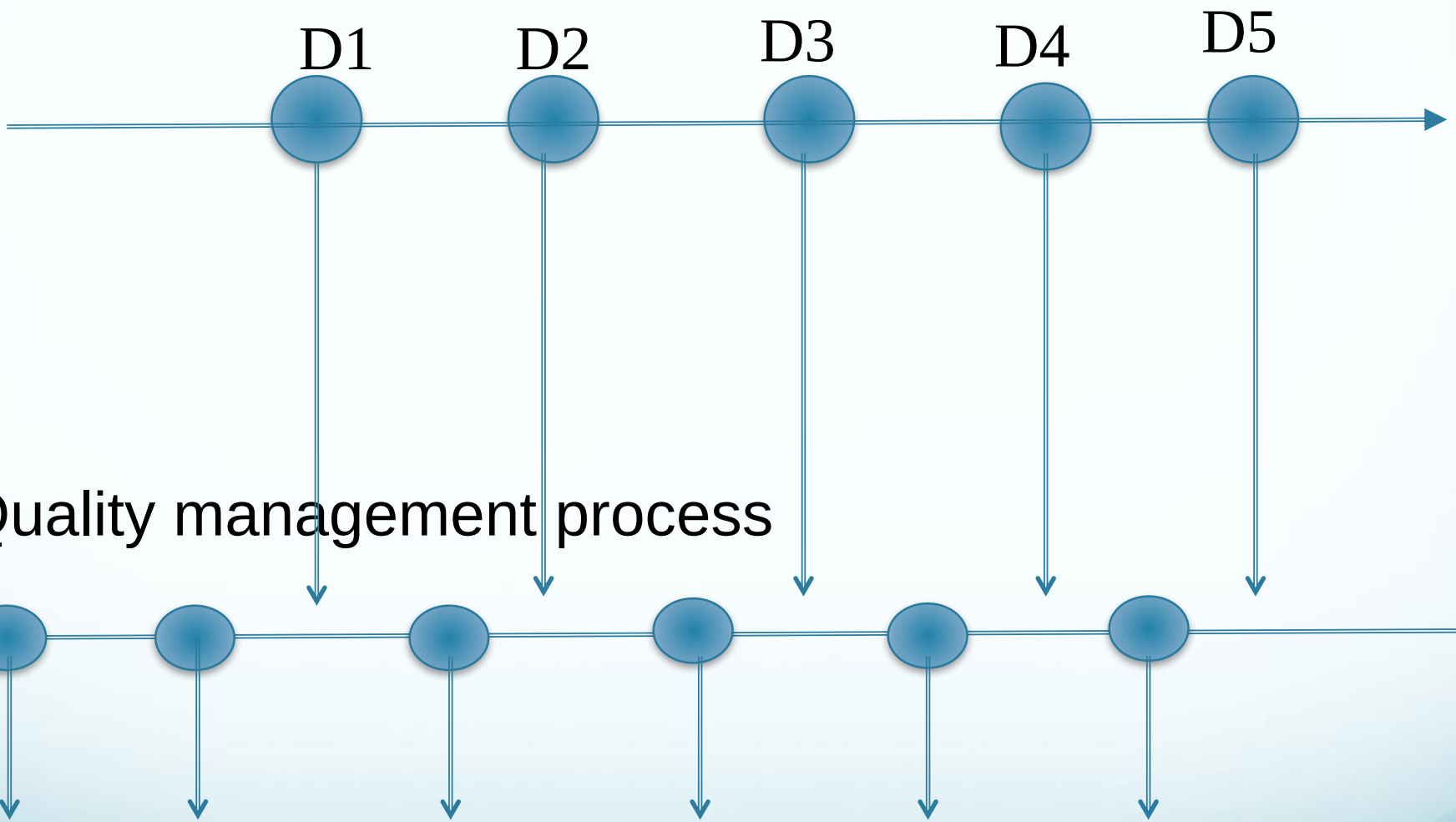
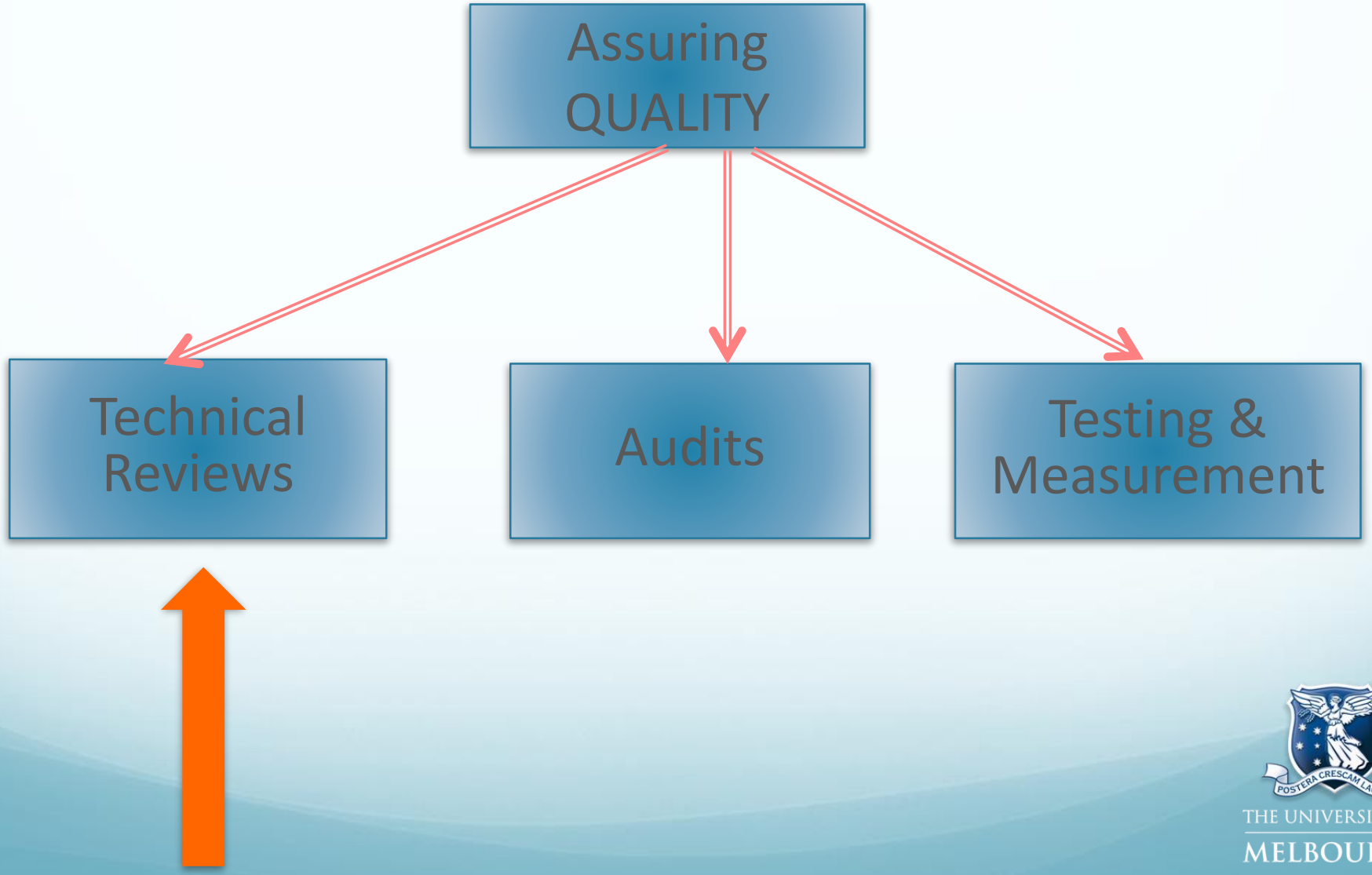
Outline Quality Plan

- Product introduction
- Product plans
- Process descriptions
- Quality goals
- Risks and risk Management
- Quality Assurance

SW development process



Quality Assurance



Technical Reviews-importance

1) Can review any SW artefacts
2) Early reviews save '$$$s, can find faults before testing & measurement
3) Pressure to release software, more mistakes occur
4) Review fault detection rate is high
5) Reviews excellent to identify faults in source code

Technical Reviews

- Peer review – critical analysis of your work
- Useful when understanding of problem and assumptions differ
- SW developers rarely find their own faults and problems

Informal Peer Reviews (technical review)

- Simple *Desk Check* /casual meeting with a colleague
- Aims to improve quality of a document
- Gloss over ‘something’ and get feedback
- Less effective than formal reviews
- *Checklists*

Checklist for software requirements specification artifact

Organisation and Completeness

- ☐ Are all internal cross-references to other requirements correct?
- ☐ Are all requirements written at a consistent and appropriate level of detail?
- ☐ Do the requirements provide an adequate basis for design?
- ☐ Is the implementation priority of each requirement included?
- ☐ Are all external hardware, software, and communication interfaces defined?
- ☐ Have algorithms intrinsic to the functional requirements been defined?
- ☐ Does the specification include all of the known customer or system needs?
- ☐ Is the expected behaviour documented for all anticipated error conditions?

Correctness

- ☐ Do any requirements conflict with or duplicate other requirements?
- ☐ Is each requirement written in clear, concise, unambiguous language?
- ☐ Is each requirement verifiable by testing, demonstration, review, or analysis?
- ☐ Is each requirement in scope for the project?
- ☐ Is each requirement free from content and grammatical errors?
- ☐ Is any necessary information missing from a requirement? If so, is it identified as "to be decided"?
- ☐ Can all of the requirements be implemented within known constraints?
- ☐ Are any specified error messages unique and meaningful?

Quality Attributes

- ☐ Are all performance objectives properly specified?
- ☐ Are all security and safety considerations properly specified?
- ☐ Are other pertinent quality attribute goals explicitly documented and quantified, with the acceptable tradeoffs specified?

Traceability

- ☐ Is each requirement uniquely and correctly identified?
- ☐ Is each software functional requirement traceable to a higher-level requirement (e.g., system require-

Formal Reviews-2

- Can :
  - Uncover *logical errors* in artifact
  - Verify that the artifact meets spec
  - Ensure the artifact achieves the requirements set out by some specified standard

Formal Reviews-3

- Review Meeting have following constraints:
  - Small – 3-5 people
  - Not more than 90 minutes
  - Roles
    - Review leader
    - Author
    - Reviewer
    - Recorder

Formal Reviews-4

- Start with an introduction of the artifact from author
- Author ‘walks through’, explains
- Reviewers raise ‘issues’
- Recorded takes note of any issues identified by the team

Formal Reviews-5

- Raising of issues, forces thinking

Recommendations following review:

1) Accept the artifact without further changes
2) Accept the artifact with minor changes, or
3) Reject artifact, request non-trivial changes, another review later

Formal Reviews-6

- Following the formal review:

1) Recorder produces a report on the findings of the review, list of issues
2) Authors change → response document outlining the where & how
3) Submit report and response as part of the project records

Walkthrough vs Inspections

- Both technical, similar rely on groups

Differences:

1) Moderator roles
2) Preparation
3) Taking action

Reviewing tips

1) Constructive criticism
2) Keep to the agenda
3) Minimise discussion and
4) Allocate time for reviews

Review Metrics-1

Reviews have its own METRICS

Total # errors found: $\boldsymbol{Err}$

Total effort including preparation, review and rework: $\boldsymbol{Effort}$

Size of the artefact: $\boldsymbol{S}$ (#pages, #models)

$$\text{Error density} = \frac{\boldsymbol{Err}}{\boldsymbol{S}}$$

Review Metrics-2

Rate of error detection:

Rate of error detection: = $\frac{Err}{Effort}$

Eg 18 Class diagrams over 32 pages and 22 errors,

Error Density = 22/18 = 1.2 *errors per class diagram*

Over 32 class diagrams=38-39 errors

Review Metrics-3

- Metrics good for effectiveness of reviews
- Measure after further quality metrics have been collected e.g. test data
- Study shows cost effectiveness of reviews
- Why? Costs during testing bigger
- Value- reviewing artefact before review

Review Metrics-4

- Error density artefact
  Calculate error density of each artefact using results of the review
- Teams can decide which artifacts are error-prone using error density
- E.g. 80 Class diagrams of sub-system team reviews 20, error density=1.2
  Another subsystem: 0.7 errors /class diagram

Software Audits

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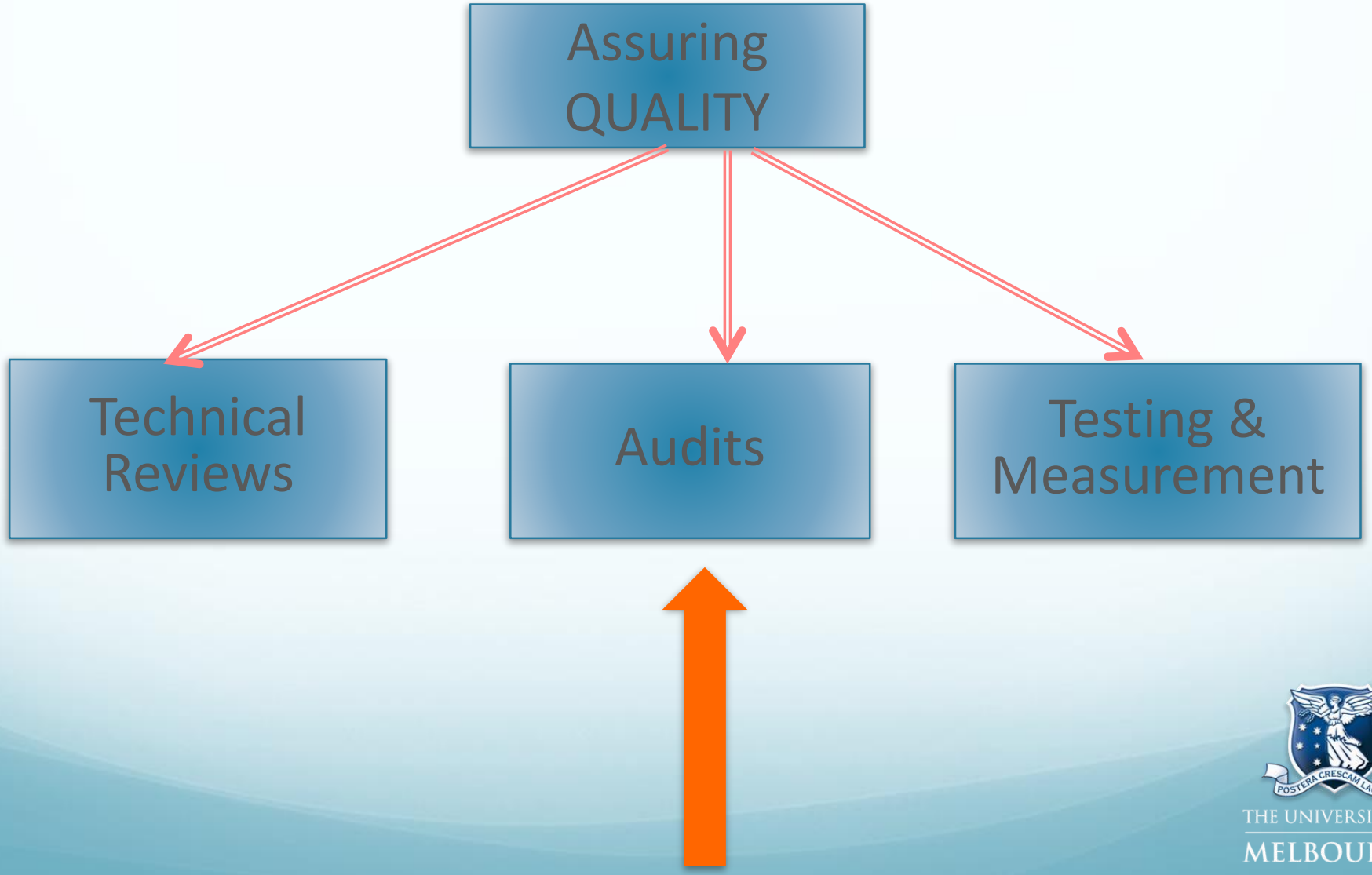
Quality Assurance



SW Audit

- Type of review except, no defects in logic or meaning BUT assess whether artifact complies to a STD or process
- Authors not involved, totally external team

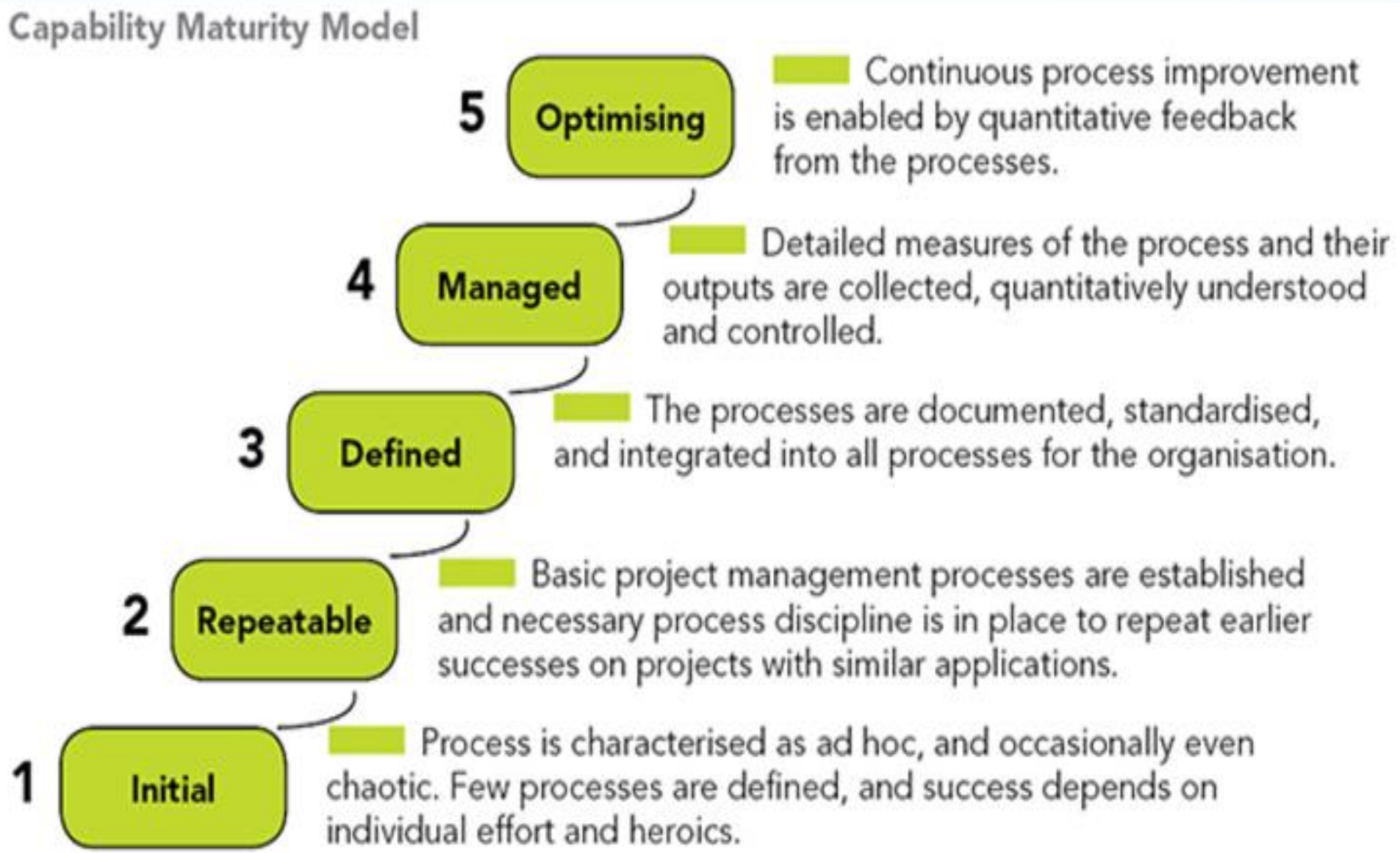
2 types:

1) Product audits and
2) Process audits

Improving Quality via process improvement

- Improve product quality requires new ways to produce them – change processes to produce
- CMM – aims to provide an assessment of the *Process Maturity Model*
- Different levels of rating

CMM Levels- SEI



See standards

- https://en.wikipedia.org/wiki/Rainbow_Series (US Rainbow)
- See also all the ISO standards at
- https://www.iso.org/iso-9001-quality-management.html

Some questions?

Week 12

Please download the SWEN90016 guide and work through the Sample Exam

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